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REPORT OF THE FEDERAL HORTICULTURAL BOARD.

UNITED STATES DEPARTMENT OF AGRICULTURE,
FEDERAL HORTICULTURAL BOARD,
Washington, D. C., October 1, 1919.

SIR: I submit herewith an executive report covering the administration of the plant quarantine act for the fiscal year ended June 30, 1919.

Respectfully,

C. L. MARLATT,
Chairman of Board.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

LINES OF WORK.

The activities under the Federal plant quarantine act which continue from year to year are the enforcement of the miscellaneous foreign and domestic quarantines and other restrictive orders listed at the end of this report. Several of these have been promulgated during the fiscal year 1919. Another important field of work of the board is in the administration of special appropriations made by Congress for the control or extermination of newly established important plant enemies. The board also cooperates with the Bureaus of Entomology and Plant Industry in the enforcement of quarantine provisions in relation to appropriations made to these bureaus for similar subjects of plant pest control.

The general organization of the work of the board, except for the necessary enlargements, remains the same as last year. Port inspection offices are now maintained at Boston, New York, Newark, San Francisco, Seattle, Calexico, and all the border ports between Mexico and Texas, and at New Orleans. An effort has been made to meet the occasional needs at other border ports by cooperation with State officials or special details of inspectors. This service is very inadequate, however, and should be greatly strengthened. The board has continued its cooperative relations with the State, Treasury, and Post Office Departments of the Federal Government, and with the State inspection and other officials. The number of such State officials appointed as collaborators of the department to assist in the board's work has been considerably increased.

The more important of these activities of the board are discussed in some detail in the following pages.

THE PINK BOLLWORM.

REVIEW OF THE WORK IN TEXAS.

The work in Texas and elsewhere in the South in relation to the pink bollworm has been, as hitherto, under the field direction of Dr.

W. D. Hunter, a member of the board, and in charge of Southern Field Crop Insect Investigations for the Bureau of Entomology. The report of last year gave a comprehensive review of the pink bollworm situation up to October, 1918. The review of the work of the last fiscal year, for convenience, takes up separately, the consideration of the conditions and crop of 1918 and of 1919, respectively.

INSPECTION AND CLEAN-UP ACTIVITIES WITH RESPECT TO THE CROP OF 1918.

The principal work of last fall and winter, extending late into the spring of this year, was in the nature of field inspections and clean-up operations, including both the volunteer cotton in the quarantine zones and the illegally planted fields in zone No. 2. All such illegally grown cotton was fully controlled as to the crop produced, including the prompt crushing of the seed and the export to foreign countries of the lint. This control was carried out under a form of agreement between the State department of agriculture of Texas and the planters of outlaw cotton, but the actual control was administered by agents of the board.

In the course of all this work no instance of reinfestation by the pink bollworm was found in any of the old areas of invasion.

THE PINK BOLLWORM APPEARS IN WESTERN TEXAS.

Late in 1918 the pink bollworm was discovered in two areas in western Texas, namely, in the Great Bend of the Rio Grande River, and in the Pecos Valley in the region of Barstow, Tex. The infestation of these two areas evidently had a common origin, namely, from seed or seed cotton smuggled across the Rio Grande River in the region of the Great Bend.

The Pecos Valley infestation was traced to some of this smuggled seed cotton which had been carted from the Great Bend district to a gin at Barstow, Tex. This infestation later was found to have extended from Barstow to the region of the town of Pecos, involving seven localities, and presented a serious situation, in that the insect was here brought into a district where cotton is commercially grown on a fairly large scale. Fortunately the infestation was limited to comparatively few fields.

The infestation in the Great Bend of the Rio Grande was scattered over a distance of 150 miles between Candelaria and Boquillas. This Great Bend district is not a cotton country, and the growth of this fiber is limited to a few scattered fields along the river in small valleys at the base of the mountains, representing altogether only a few hundred acres. The infestation here appears to have resulted from an original infestation on the Mexican side of the river opposite Candelaria from planting seed brought by immigrant farmers from the Laguna district of Mexico. Part of the spread along this district may have been due to water carriage from infested fields on either side of the river.

Immediately on the discovery of these new points of infestation active work was undertaken to exterminate the insect along the lines which had been so successfully followed in eastern Texas, both with respect to cleaning the cotton fields and the safeguarding of the crop

of seed and lint of 1918. In the meantime an intensive survey was made of the entire Rio Grande and Pecos Valley districts without the location of other infested cotton.

The clean-up operations in the Rio Grande Valley were comparatively simple on account of the small acreage. The similar operations in the Pecos Valley assumed considerable proportions and involved at times a labor force of from 500 to 1,000 persons. In this work cooperation was secured with the War Department to the extent of the loaning by that department of considerable equipment for the housing of labor, the available equipment which had been accumulated by the board in the previous year's work in southeastern Texas not being sufficient for the needs. The farmers also cooperated very heartily in this work, and other labor was obtained from El Paso and like near-by sources. The infestation in the Pecos region was very slight, less than a score of larvae being found altogether. To be on the safe side, however, the area cleaned was extended well beyond the outer infested points, involving perhaps altogether in the Pecos Valley nearly 5,000 acres.

Neither of these new regions presented the same risk to the cotton industry of the South as did the outbreak in eastern Texas, on account of their remoteness from other areas of cotton culture. In view of this fact and, as applying to the Pecos district, the consideration that alfalfa—the only other dependable crop in this district—could not be successfully established in the spring of 1919, a plan was devised permitting the planting of cotton in the Pecos district for 1919 under what seemed to be fully adequate safeguards. The cotton seed for planting of the 1919 crop was obtained from uninfested districts and the crop of this year has been and will be under the full control of the State and Federal authorities. The planters have agreed to the further condition that after 1919 this district shall become a strictly noncotton zone for such period as may be determined to be necessary.

A noncotton zone was immediately established for the Great Bend district of the Rio Grande. This action was taken on account of the known infestation on the Mexican side of the river and the probability that otherwise Mexican cotton would be smuggled across, which it would be impossible later to distinguish from cotton grown on the American side.

GROWTH OF COTTON PERMITTED IN THE QUARANTINED ZONE OF EASTERN TEXAS.

With respect to the proclaimed noncotton zones in eastern Texas of 1918, a plan of agreement was entered into for the planting of cotton in these districts under strict State and Federal supervision. The planters in this region were very insistent that they should be allowed to plant cotton under suitable precautions. The fact that the great majority of the planters in these areas had cooperated heartily in the enforcement of the noncotton restrictions in 1918, and the further fact that no infestation by the pink bollworm had been discovered throughout that year in any of the volunteer cotton or in the illegally planted fields, led the State authorities, after consultation with this department, to devise a plan for the planting of cotton in these areas, other than the zone on the Mexican border. In addition to the control which the State will exercise over the crop—crushing all seed and foreign export of lint—such planters entered into an agreement to

permit any radical steps which may be necessary to exterminate any outbreak which may result from such planting.

INSPECTION ACTIVITIES DURING THE GROWING SEASON OF 1919.

An important feature of the work during the spring and summer of 1919 has been the following up of all clues of possible distribution of Mexican cotton lint to mills in cotton-growing areas of the South prior to the quarantine of 1916. The tracing of this cotton has covered not only the original sale of such cotton but all resales and also all distributions of picker waste or motes from mills in which such cotton was utilized. This and similar inspection work has extended from the Carolinas, where several thousand bales of Mexican cotton were purchased and utilized just prior to 1916, through the other cotton States to Arizona, where there has been and is danger of infestation by carriage of seed by Mexican laborers. The cotton fields in all such districts surrounding mills or in other situations where risk had been determined have been given repeated inspections throughout the season. The bulk of this work has naturally been in Texas, where particular attention has been paid to the localities in eastern Texas infested in 1916 and 1917 and in the vicinity of the 12 mills which received Mexican cotton seed in 1916. The Pecos Valley crop of this year, and the cotton planted under State and Federal control in the former quarantined districts in eastern Texas also have been given frequent and intensive inspections.

THE PINK BOLLWORM APPARENTLY EXTERMINATED.

As a result of all this inspection activity, both as to quarantined and regulated districts in Texas and as to all other points of possible infestation throughout the cotton area of the United States, no evidences whatever of the pink bollworm have been determined this year. This is a most encouraging result and indicates the probability of a successful outcome of this tremendous effort to control an important foreign pest after it had become fairly widely and firmly established. This outcome has been made possible by the fact that the insect is substantially limited to one food plant grown under cultivation and in the western districts wholly under irrigation. Undoubtedly certain temperature conditions of the winter of 1918 and 1919 unfavorable to the insect have aided in obtaining this result. One adverse feature may be noted, namely, the failure of the authorities of the State of Texas to enforce fully the prohibition of the growth of cotton this year in the Great Bend district of the Rio Grande. One hundred acres of cotton were planted in this district by a grower, and in spite of urgent recommendations made by this department this field has been left to mature. Undoubtedly this crop can be safeguarded, but it will make more difficult the enforcement of noncotton zones in the future.

USE OF AEROPLANE IN SURVEY WORK.

That it is possible to use the aeroplane in a practical way in the cotton survey work, and particularly for the location of cotton fields which might otherwise escape detection, was demonstrated during

1918 and 1919 in the cotton inspection and control work in Texas. This activity was made possible by an active interest and cooperation on the part of the War Department. Competent pilots and aeroplanes were loaned for this work, which was prosecuted for over a year with great success and was particularly valuable in the scouting work necessary along the long stretches of the Rio Grande, where roads and other means of transportation are poor or insufficient. A preliminary use of the aeroplane had, however, been made the year before, which had resulted in the discovery of some fields in the wooded and sparsely settled portion of a quarantined district which had been theretofore overlooked. The following officials of the Aviation Service of the Signal Corps of the Army have been assigned from time to time to this work: Second Lieut. Harold Compere and Second Lieut. William H. Tillisch. The expert inspectors of the board associated with this work as observers have been H. S. Hensley, Carl Heinrich, and E. L. Diven.

This work was terminated August 7, 1919, as the result of an accidental fall of the aeroplane in which both the pilot, Lieut. Tillisch, and the observer, Mr. Diven, lost their lives. Although these flights had been conducted over a long period without serious accident, the danger of the service was fully recognized. Both Lieut. Tillisch and Mr. Diven were men of high character and undertook the work with a full realization of its dangers. Lieut. Tillisch, who could have been discharged from the War Department, remained in its service on account of his interest in this new use of the aeroplane. The greatest honor is due these men for their courage and devotion to a service which unfortunately involves the highest personal risk. They may be considered the pioneers in this country in the use of the aeroplane in a practical way in relation to agriculture.

A NEW TEXAS PINK BOLLWORM ACT.

On March 10, 1919, a new pink bollworm law was enacted by the State of Texas and made immediately effective. This act is a revision of the previous act. Its principal new feature is the provision for the establishment of zones or districts in which the growing of cotton may be permitted under regulation, the immediate object being to permit the growth of cotton under restrictions in the old quarantined areas of eastern Texas.

This act provides for a commission of five entomologists to determine the necessity for the establishment of quarantine areas within the State of Texas. The members of the commission as now created under the terms of the act are: Ernest E. Scholl, designated by the commissioner of agriculture; W. D. Hunter, designated by the Federal Horticultural Board, United States Department of Agriculture; F. B. Paddock, designated by the Agricultural and Mechanical College of Texas; N. Hess, appointed by the governor of Texas, and an entomologist to be appointed by the county judge in the county in which the fields believed to be infested are located.

On the recommendation of this commission the necessary quarantine action has been taken by the governor under the new law with respect to the several districts in Texas which have at any time been infested by the pink bollworm and also with respect to the border noncotton zones.

The old Trinity Bay district has been declared a regulated zone by orders of March 15 and April 24. This zone includes all of the counties surrounding Trinity Bay included in the noncotton zone of 1918, except the extreme western portion, which has been released from all quarantine restrictions. This is the important cotton-producing territory bordering the Brazos River in Brazoria and Fort Bend Counties, which was included in the quarantine of 1918 merely as an additional safeguard.

The territory actually infested in 1917 in the small Hearne district has been continued as a noncotton zone by an order dated April 24. Furthermore, cotton grown within a radius of 3 miles of such zone is brought under regulation by another order of the governor of the same date.

By orders dated April 9, 1919, the governor of Texas has reissued under the new act the old border noncotton zone, including Maverick, Kinney, and Valverde Counties, and has established additional quarantine zones to cover the new infested territory in western Texas. These are a noncotton zone comprising the counties of Presidio and Brewster, which include the infested territory in the Great Bend of the Rio Grande, and a special zone comprising the counties of Ward and Reeves to include the infested territory of the Brazos River. Supplementing the latter special zone, two proclamations were issued by the governor of Texas under date of May 1, 1919, establishing regulated zones covering all territory within 5 miles of and including the fields in Ward and Reeves Counties which were determined as infested with the pink bollworm as to the crop of 1918.

After a conference with the Federal authorities cooperating with the State of Texas in the pink bollworm work, regulations were issued under date of April 24, 1919, by the commissioner of agriculture of Texas, governing the planting and the safeguarding of the cotton crop produced in the three regulated zones. In other words, cotton may now be grown under regulation in all the zones established in the interior of Texas, with the exception of a small portion of the Hearne zone, and the growth of cotton is prohibited in two border zones involving the Great Bend district and the old border noncotton zone of last year, including the counties of Maverick, Kinney, and Valverde.

THE PINK BOLLWORM IN MEXICO.

The survey and inspection of the cotton grown near the border of Mexico adjacent to the United States has been continued, covering the more important areas between Brownsville and Eagle Pass, Tex. No new infestation has actually been found anywhere near the border in this portion of Mexico. One locality, however, at Guerrero, 9 miles from the Texas border, opposite the town of Zapata, is under suspicion because of the determination that certain fields at that place were planted from seed obtained from an infested locality in Mexico. This planting has a special importance from the fact that a stream of considerable size flowing from this district discharges into the Rio Grande not far above extensive cotton cultures in both Mexico and the United States, and therefore may ultimately be the means of conveying the insect to these cultures.

The only new infestations determined in Mexico are the scattered fields opposite Candelaria, in the Great Bend district, already noted.

Until conditions in Mexico materially improve there seems to be little likelihood of any serious effort being made on the part of the Mexican Government or planters to eliminate cotton culture in the Laguna or other infested regions and to take steps similar to those taken in Texas to exterminate the insect. No wide survey of Mexican cotton growing is possible under existing political conditions.

The research work conducted at the Lerdo station in the Laguna has been maintained throughout the year with very satisfactory results. Some forty to fifty thousand larvae were collected in the fall of 1918 for winter, spring, and early summer observation and experimentation. It is believed that by the end of this season the full biological data of the insect will have been worked out, so that this station can thereafter be discontinued. It is too early at this writing to determine the amount of damage which this insect has caused to this year's crop in the Laguna and elsewhere in Mexico. The loss to the crop of 1918 amounted to approximately 30 per cent, involving, as it did, much of what would have been the second and third pickings. From 100 bolls picked at random in late September were taken 920 larvae. The normal yield of the Laguna is very high, and even with this reduction a profitable crop was secured.

The practical control experiments carried out in cooperation with leading planters in the Laguna have indicated the possibility of a large reduction of loss by cultural methods; namely, fall cleaning and destruction of old plants and the replanting with clean seed. This is substantially the control system now practiced in Egypt and is possible under such low labor cost as obtains in Egypt and in Mexico. Under the labor scale in the United States the intensive clean-up methods required would be almost prohibitive in cost.

The important phases of the work in the Laguna have been (1) a continuation of life-history studies of the insect; (2) the determination of the importance of alternative food plants, such as okra and possible native Mexican and Texas malvaceous plants related to cotton—a considerable quantity of seeds of these plants having been collected in Texas, and the plants are now being grown in the Laguna for the purpose of this experiment; (3) determination of control possibilities by poisoning and by cultural methods; (4) determination of the amount of damage throughout the season; and (5) the determination of the extent of natural distribution and of the possibilities of distribution through the agency of irrigation canals.

With respect to alternative food plants this work has shown that Hibiscus and other plants closely related to cotton may serve as hosts for the pink bollworm, but has fully demonstrated the fact that cotton is much the favored host plant. In this connection studies of the last two years have indicated that under conditions obtaining generally in Texas cotton is practically the sole food plant of the insect.

TEXAS BORDER QUARANTINE SERVICE.

The Texas border inspection and quarantine service to prevent the movement of cotton and cottonseed into the United States has been continued actively during the year under the general direction of Mr. R. Kent Beattie. The volume of the work has necessitated a

considerable increase in the number of inspectors. The car fumigation houses referred to in the previous report have been completed. An increase of \$100,000 was granted by Congress in the appropriation for the Mexican border work to cover the cost of the chemicals and labor involved in the disinfection of railway cars and freight in these specially constructed fumigation houses. To cover this cost the Secretary of Agriculture is authorized to fix charges for such cleaning and disinfection, the moneys thus received to be covered into the Treasury as miscellaneous receipts. Delays in securing equipment and installation of the machinery designed for the generation of the hydrocyanic-acid gas have prevented the inauguration of this new form of disinfection, and in the meantime the disinfection and cleaning by the older methods have been carried out under the supervision of the department's inspectors. From the 1st of October the disinfection along the border will be in these houses under the direct supervision of the inspectors of this department.

The inspectors of the board at the border ports of Mexico have the additional duty of enforcing the various quarantines which affect Mexican products other than cotton, and to facilitate this work a warning placard to passengers was issued by the Secretary of Agriculture under date of August 10, 1918, calling attention to the prohibitions affecting the entry from Mexico of various fruits, sugar cane, nursery stock, and sweet and Irish potatoes, in addition to cotton, cotton seed, and cottonseed products.

Inspection forces were maintained at Brownsville, Laredo, Eagle Pass, El Paso, and Del Rio, Tex. At the first four points mentioned railroad lines cross the border. At these points all the cars and freight offered for entry into the United States were inspected and passed for entry if free from cotton seed or lint. In the great majority of cases these cars were also fumigated with hydrocyanic-acid gas under the direction of the inspectors immediately upon their crossing into the United States. During the year 16,597 cars were passed for entry at these four ports. About 43 per cent of these cars were empties, 14 per cent contained ore, 12 per cent hides, 1 per cent scrap iron, 1 per cent bones, and the rest contained miscellaneous cargoes invoiced under 46 different headings.

No railroad crosses the border at Del Rio, but the existence of an infested area in Mexico, in the immediate vicinity of this port, made necessary the inspection and cleaning of vehicles here, to the number of about 175 per week.

THE EUROPEAN CORN BORER.

An important European crop pest now designated in this country as the European corn borer, but infesting many other crops, has recently gained entrance into the United States and may develop into one of our most injurious insects. The increase of our knowledge of the distribution and of the plants attacked in the United States by this pest has been very rapid, and the board has conducted three hearings and one conference on the subject and has participated in several field surveys of the regions infested in cooperation with experts of the Bureau of Entomology and State officials.

MEANS OF INTRODUCTION AND SPREAD.

The European corn borer was discovered late in 1917 as an enemy of corn in the vicinity of Boston, Mass., in what was believed at that time to be a rather limited area of perhaps 100 square miles. Hemp straw which had been imported from Europe and utilized in the vicinity of Boston some years before for rope making was then thought to have been the means of introducing this insect. From present information, it seems much more probable that the insect was introduced about nine years ago with large importations of Hungarian broom corn to meet the then existing shortage in the United States of this crop. Of this imported broom corn, some hundreds of tons were utilized for broom making in Boston and like quantities went to New York, Kentucky, and other points in the Middle West. The later discovery of the further spread of this insect in the United States seems to correspond closely with the distribution of this imported broom corn. For example, late in 1918, the insect was found to have invaded the Mohawk Valley for a considerable distance, extending from the neighborhood of Albany, N. Y., some 25 or 30 miles up the Mohawk Valley and northward nearly to Saratoga Springs. At the upper part of this district a very large quantity of this imported broom corn had been utilized in a local broom factory.

The distribution of this insect as now known covers an area of over 1,200 square miles about Boston, touching the border of New Hampshire and involving two towns in that State. Another considerable outlying point in Massachusetts, involving four towns, was determined in August of this year, 65 miles distant from Boston, at the base of Cape Cod Peninsula. The Albany area in New York has been considerably extended. Two new points of invasion have been determined in New York State: one on the east side of the Hudson River, opposite Albany, and the other 200 miles farther west in extreme western New York. A similar point of infestation has also been determined in Erie County, Pa. These last two areas were discovered in late September, 1919. These wide extensions of the insect indicate the need of a thorough-going survey of the northeastern quarter of the United States, and especially such districts as those in Kentucky and in the upper Ohio Valley which are known to have received greater or less quantities of imported broom corn about the same time that it went to Massachusetts and New York. These surveys are now (October) in progress.

FOOD PLANTS IN THE UNITED STATES.

While this insect has been designated as the European corn borer, it infests, as already noted, many other plants, such as most annuals, including common grasses, small grains, most garden vegetables, and weeds; in fact, almost any plant which is not of a hard or woody nature. The fact that this insect is an internal feeder, working in almost any part of the plant and even penetrating the base of plants beneath the ground, together with the almost unlimited number of plants in which it can develop, makes any determination of its actual spread in the United States practically impossible, and this has an important bearing on questions of quarantine or possible future extermination.

NATURE AND AMOUNT OF DAMAGE.

Present experience with it in this country would seem to indicate that corn is its favorite food plant. Its work on certain garden vegetables and truck crops other than corn has caused no economic losses to such crops, or only trifling losses, and is significant only as indicating that some of these may be the means of spreading the insect.

In the relation of this insect to corn, there are, fortunately, some hopeful features. It develops from the experience of this year that it is double-brooded in Massachusetts and single-brooded in New York, owing to differences in climate. As a single-brooded insect in New York, its damage to corn has been negligible as reflected in the crop. In Massachusetts, even with the large numbers resulting from the second brood, its damage has seldom exceeded 10 per cent of the ears and in most fields in the invaded districts much less than this. Even the injury to such ears has been as a rule not greater than that produced by the ordinary corn ear-worm over large areas of the United States where the latter insect is an important annual pest, often infesting all or nearly all ears of corn. The highest damage in Massachusetts has represented about 25 or 30 per cent of the ears, and this has been in isolated fields surrounded by weedy areas more or less infested with the insect, the corn therefore in a way concentrating the insect from these surrounding sources of supply. The insect is essentially a stem or stalk borer, and apparently corn can harbor from one to several of these insects in a stalk without appreciable effect on the development of the ear. In the case of early corn, its infestation of the stalk is very apt to come after the ear is practically ready for harvest, and infestation of the stalk may increase and continue even for a considerable period after harvest.

From the experience in New York, where the insect has evidently been for about nine years, it would seem to be fully established that as a single-brooded insect it will be a negligible factor in relation to corn production, and this is especially emphasized by the fact that the crop of the New York district is almost altogether of the small flint corn which in New England has been notably susceptible to damage.

In climates where the insect has two broods, as in New England, and perhaps as in the South, the possibilities of damage are much greater. With respect to these possibilities, however, it should be noted that the few patches of large-stalked vigorous field corn such as characterizes the great corn belt of the United States, grown in the invaded areas in Massachusetts as a part of the department's experiments and by farmers, have shown an almost complete immunity from serious infestation by this insect. It remains to be determined, therefore, whether this insect will actually develop into a real menace to the great corn crop of the United States. That much harm can be done by this insect where it is double-brooded, as in New England, to sweet corn and to such dwarf corn as the flint varieties commonly cropped in the upper limits of the corn belt of the United States, seems to be demonstrated. In regions where such corn is grown, however, the insect will undoubtedly be generally single-brooded. Immediately about Boston the climate is apparently made more favorable to the insect by ocean currents.

STATE AND FEDERAL CONTROL WORK.

Following the determination by the Massachusetts authorities of the establishment of this insect in that State and the efforts on the part of the department of agriculture of that State to cope with the insect, the Federal Government was called upon to assist the State authorities by establishing a Federal quarantine and by aiding in control and, if possible, exterminative work. In response to this request, following a formal hearing on the subject, a quarantine was promulgated, effective August 1, 1918, covering the then known infested area in Massachusetts and prohibiting the movement therefrom interstate of corn fodder and cornstalks, whether used for packing or otherwise, and green corn, roasting ears, corn on the cob, or corncobs.

The discovery of the new important areas in New York in the fall of 1918 was followed by a second hearing, February 26, 1919, for the purpose of bringing within the scope of this quarantine this newly discovered infested territory. As a result of this hearing it was decided to defer taking additional Federal quarantine action until a more accurate determination had been made of the spread of the insect. This decision was based on the fact that both of the infested areas were entirely within the States involved, and on the definite understanding which was expressly given by the representatives of these two States that effective quarantine control would be exercised over the infested districts within their borders so that there would be no possibility of interstate movement of infested products. Quarantine orders were shortly thereafter issued by the commissioners of agriculture of New York and Massachusetts covering the invaded areas in each of these States. The Massachusetts order was based on a new quarantine law enacted by that State April 11, 1919, having particular reference to the European corn borer. The Massachusetts order issued under date of May 1, 1919, prohibited the movement from any point within the areas infested by the corn borer surrounding Boston of the corn and corn products enumerated in the Federal quarantine. The New York order prohibited movement from any point of the area infested with the European corn borer in that State to any point outside of the quarantined area of corn and also of a large series of truck plants and ornamental and flowering plants. Both of these States made appropriations which ultimately amounted to \$100,000 each for the cleaning up of the infested cornfields. The enforcement of these State quarantines was co-operated in by the Federal authorities.

In view of the further spread of this insect in Massachusetts and elsewhere and the large number of food plants which in New England had not been brought under control by the State quarantine, a third hearing on the subject of this corn borer was conducted August 15, 1919. This hearing was held at the statehouse, Boston, to give opportunity for local truck growers and commission merchants who would be largely affected by the quarantine to participate in the discussions. It was apparent from the information developed at this hearing that the territory invaded by this insect in Massachusetts, and perhaps elsewhere in New England and in New York, was so inadequately determined as to make a quarantine covering merely the area then known to be invaded in these two States thor-

oughly impracticable and useless, and that any quarantine in respect to this insect to be of value and at all efficient must include New England and New York as a whole. Such quarantine, if established, could be graded with respect to the areas known to be infested as opposed to the areas not known to be infested. It was manifested also that the restrictions should cover not only corn, but all other articles of common commerce for food purposes, such as spinach, celery, beans, beets, etc., which have been shown to be capable of carrying the insect. This determination as to the area to be covered was further shown to be necessary by the fact that much of New England is dependent for its important elements of food supplies on the products of the infested area, and the representatives of the surrounding States were not willing to have these sources of food shut off. A quarantine taking in the area as a whole, therefore, would leave opportunity for the normal movement of food within the quarantined area to meet the needs of the summer and native populations of these States.

The rapid development of the knowledge of the distribution of the insect has served to withhold action on a further Federal quarantine until the results of the fairly wide survey which is now in progress shall be available.

The work with respect to this insect as now planned under the Bureau of Entomology in cooperation with this board has for its object: First, the determination of the present distribution of the insect as a basis for quarantine and other control measures; and, second, a demonstration on a large scale of such control measures. The area to be surveyed is large, including New England, New York, and in a general way all the States east of the Mississippi. The object of the proposed control experiments is to determine whether such control looking even to extermination is feasible and practicable under the conditions of infestation as they are seen in both Massachusetts and New York. In the meantime tests will be continued to determine the possibilities of damage which this insect may have to the coarser and stronger kinds of field corn which represent the predominating elements of the corn crop of the United States.

For the prosecution of the work for control and enforcement of the quarantine against this pest, Congress was asked last year for an appropriation of \$500,000. Of this sum, \$250,000 was granted by Congress and became available July 24, 1919. This fund, assigned to the Bureau of Entomology, is now being used by that bureau in carrying out the program of work just outlined, in cooperation with the board as to quarantine matters.

The exploitation which has been given to this insect and the unwarranted forecasts of future losses from it have led to widespread fears of damage to the corn crop of the country. These fears were reflected in a called meeting of the National Association of Commissioners of Agriculture, held at Albany, N. Y., and Boston, Mass., on August 28 and 29, respectively, of this year. The outcome of this meeting was a series of resolutions urging Congress to appropriate \$2,000,000 to carry on the corn-borer work. The department's views with respect to the immediate and future needs for the purpose of carrying out the program described is that an additional appropriation at this time of \$500,000 will enable this department fully to determine the status of the pest as an enemy of corn and other crops,

its present distribution, and the possibilities of control, and that larger appropriations, if they are to be made, should await the determination of these fundamental features of the problem.

THE JAPANESE BEETLE.

The Japanese beetle, reported to be one of the most injurious insects in Japan, was apparently introduced seven or eight years ago in the vicinity of Riverton, N. J., in soil with imported Iris roots. When this insect had increased sufficiently to attract notice it had thoroughly established itself over some 600 acres and at present covers perhaps 10,000 acres, with outlying points of infestation involving approximately 25,000 acres. The Japanese beetle is a general feeder, attacking the grape, peach, plum, apple, and cherry, as well as many ornamental plants and weeds and various truck crops, such as sweet potato, and especially sweet corn. In the case of corn the beetle penetrates the tips of the ears, working in very much the same way as the common ear worm, and as it remains in these ears for an indefinite period, it is possible to transmit it widely with shipments of green corn to various markets.

Following the discovery of possibilities of wide harm to various agricultural products, a hearing on the subject of this pest was conducted, and a quarantine was shortly thereafter promulgated covering the territory more or less invaded by this insect, namely, the townships of Delran, Chester, and Cinnaminson, county of Burlington, N. J. Inasmuch as the probable sole export from these townships of plants which would be the means of conveying the insect is sweet corn, the quarantine prohibits the movement interstate from the quarantined district of green sweet or sugar corn other than in accordance with the rules and regulations drawn under the quarantine to protect such movement.

In the enforcement of this quarantine and in the campaign looking to the eradication of the insect authorized by Congress the board is cooperating with the Bureau of Entomology of this department and with the officials of the State of New Jersey.

THE POTATO WART IN THE UNITED STATES.

The fact that the European potato wart disease had secured foothold in the United States was announced in the annual report of the board for last year. The disease was discovered in September of 1918, subsequent to the period covered by that report but prior to its publication. At that time the disease seemed to be restricted to three counties in eastern Pennsylvania, namely, Luzerne, Schuylkill, and Carbon Counties, involving house gardens in some 26 mining towns in these counties. It was apparent that the disease had originated from the shipment into Pennsylvania of about 12 carloads of European potatoes of inferior quality in 1912, before the passage of the Federal plant quarantine act of August 20 of that year. This act specifically provided for an immediate quarantine against the countries infested with the potato wart, and subsequent to the passage of this act no importations of potatoes have been made from countries where the wart disease is known to exist.

In view of the menace of this disease to the potato crop of America, a special fund of \$50,000 was appropriated by Congress for the fiscal

year 1920 to enable the Secretary of Agriculture to effect the extermination of this disease in Pennsylvania or elsewhere in the United States in cooperation with the State or States concerned. Under this appropriation the board is actively cooperating with the State of Pennsylvania in the control of this disease, and particularly in a country-wide survey of the potato crop to determine the possible occurrence of the disease in other places. Over 3,000,000 bushels of European potatoes entered the port of New York in 1911 and 1912, and other smaller shipments arrived at other ports. It is impossible to trace in detail the distribution of these importations, but enough information has been secured to show that they were widely distributed, going as far south as Florida and Texas and as far west as Nebraska, with possibilities of some movement to the Pacific coast. In view of this situation, a very extended survey has been conducted during the last two months (August and September, 1919), following the potato crop from the South northward in co-operation with the experts of the various States concerned. By full publicity and the cooperation of county agents, boys' and girls' clubs, and other available agencies, these surveys have been made much more comprehensive than the available funds would have made possible otherwise. This survey has been especially intensive in all mining and industrial districts, it being realized that the appearance of this disease in the important potato-growing sections would be very promptly reported, but that it might remain hidden and concealed in the districts where the growth of potatoes was limited to garden cultures.

Up to the end of September this survey had been carried as far north as West Virginia, and these States and Pennsylvania, New York, and the New England States are still under examination. As a result of this survey this disease has been located in new districts in Pennsylvania and has been found also in West Virginia. In Pennsylvania the disease has been determined in three separate localities in Cambria County in southwestern Pennsylvania. This is in a bituminous coal-mining section. In the meantime the inspectors of the State of Pennsylvania have somewhat extended the limits of the infestation in the old area in the eastern part of the State. In West Virginia the wart has been found in one garden in Randolph County and in about 10 gardens in Tucker County. The infested area in Tucker County is again a mining area, while the infested area in Randolph County is in a section which is being developed as a potato-growing region and particularly as a source of "certified stock."

In the Rocky Mountain and Pacific Coast States an educational campaign has been undertaken, no garden-to-garden search being attempted.

A hearing was held January 28, 1919, with respect to a domestic quarantine on account of this disease, but in view of the fact that the area was limited and was at that time entirely within the State of Pennsylvania, and that this State was undertaking active quarantine and other control operations, a Federal quarantine did not seem to be needed and has not been promulgated.

The most important immediate step is the further determination of the spread of this disease and of its importance as a potato pest to this country. Such determination of spread must be made before

it is practicable to consider the promulgation of a Federal quarantine.

One very hopeful feature, however, has appeared in the work of this year, namely, that several of the most important potato varieties grown in this country are apparently immune to the disease. This is especially true of the Irish Cobbler and the Rose 4.

The danger of immediate spread of the disease is very much reduced by the fact that there is no important commercial potato production in the invaded districts. The infestation, however, has manifested itself in a very severe form, practically destroying the entire crop in many of the affected gardens.

The importance of a study of the potato wart conditions in England, Scotland, Wales, and Ireland, so as to be able to take immediate advantage, in the work in this country, of any effective control methods, either from the use of immune varieties of potatoes or through cultural operations which have been developed in the many years of experience with this disease in these foreign countries, led the board to make such investigation in Great Britain and Ireland. This work was carried out for the board, in cooperation with the State of Pennsylvania, by Mr. J. G. Sanders, Director of the Bureau of Plant Industry of the Pennsylvania State Department of Agriculture, who is collaborating with this board in the control of the potato wart outbreak in Pennsylvania. It has resulted in the securing of information which will be of much advantage to the work in this country. One of the results is the proposed introduction of certain varieties of potatoes which are believed to be immune to the disease and which have marked color characteristics, enabling them to be easily distinguished from other potatoes, with the object of utilizing them for planting in the invaded districts in lieu of actually prohibiting potato culture in such districts. Prohibition of potato culture would lead to wide dissatisfaction on the part of the miners and other inhabitants of these districts, mostly of foreign nationalities, who would hardly understand and appreciate the need of such strict quarantine measures. The Bureau of Plant Industry of the Department of Agriculture is planning, in cooperation with the board, to introduce a considerable series of these and other British potatoes which have been demonstrated to be substantially free from any or serious damage from this disease. These varieties will be obtained from regions in the countries concerned which are believed to be free from the disease and will be utilized, through the experimental period, only in districts in this country where the disease is already established. This phase of the investigation assumes great importance in view of the known wide distribution of the European importations of 1911 and 1912 and the considerable number of new points of infestation determined for the disease during the year, indicating a possibility that the disease may be so widespread that it may not now be possible to effect its eradication in this country.

THE FLAG SMUT AND TAKE-ALL DISEASES.

In response to representations made to the board by the Bureau of Plant Industry as to the risk from two important diseases, namely, the flag smut and take-all, affecting wheat and other cereals in

foreign countries, a hearing on the subject of these two diseases was held March 25, 1919. It was pointed out in the notice of hearing that the take-all disease was widely prevalent in Australia and reported to occur also in Italy, France, Belgium, Great Britain, Ireland, and Brazil. The flag smut disease was known to exist in Australia and also in India and Japan. The flag smut is a disease of wheat. The take-all disease may infest, in addition to wheat, oats, barley, rye, and rice.

The flag smut affects the leaf blades, leaf sheaths, stems, and sometimes the spikes of wheat. Usually every shoot is affected, the leaves wither, and the spike is frequently replaced by a mass of twisted leaves. The spores are carried on the seed and live over in the soil. In portions of Australia the losses from this disease run from one-tenth to one-half of the crop.

The take-all disease, known also as whitehead or foot rot, attacks the roots and the bases of the plants, rotting the roots and blackening the base of the stem. Young wheat plants speedily wither and die; older ones may survive but rarely produce grain. Heavy losses have been sustained in all countries where this disease occurs.

The risk of introduction of these two diseases was largely from the possible importation of any of the grains mentioned for seed purposes. War conditions, however, had led to some commercial importations of wheat from Australia and there was a possibility of further commercial shipments from this source on account of the large accumulations of wheat in that country.

The hearing on this subject brought out rather distinctly the need of controlling the entry of foreign wheat, either for food or for planting purposes. The promulgation of the quarantine was postponed pending the determination of the practicability of disinfecting wheat from the countries under consideration as a basis for fixing the restrictions which would be placed upon the entry of such wheat. On the completion of this inquiry the quarantine was promulgated July 2, 1919, effective August 15, 1919, with regulations governing the issuance of permits, sterilization, and other conditions of entry. This quarantine prohibits the importation of seed or paddy rice, but places no restriction on the importation of husked or polished rice imported for food purposes.

THE FLAG SMUT AND TAKE-ALL DISEASES IN THE UNITED STATES.

While the steps described were being taken with respect to the control of the entry of foreign wheat, these two diseases, flag smut and take-all, were discovered to be already present in southern Illinois and the take-all disease in Indiana, the evidence seeming to indicate that they had been in southern Illinois for two or three years. The source of entry of these diseases into this country has not been determined, but it is believed to have been through some importation of seed wheat from Australia or other foreign country. This discovery was followed up by an intensive investigation of the principal wheat-growing areas of the United States in which the board cooperated with the Bureau of Plant Industry and with the officials of the several States concerned. These field investigations failed to demonstrate the occurrence of these diseases at that time at any other points, and this situa-

tion as to infestation remained unchanged until September 18, 1919, when the disease was apparently definitely determined as existing in Roanoke County, Va.

As soon as the survey had been substantially completed a public hearing as a basis for a domestic quarantine on account of these two diseases was held at the Department of Agriculture, July 15, 1919. The subjects of the hearing were thoroughly discussed by a large attendance of State officials, grain dealers' and millers' associations, and as a result of the information obtained—which indicated that the States concerned had ample legal powers to take the necessary steps to control the diseases and to prevent the interstate movement of diseased products, and that in the case of Indiana such measures had already been instituted—the department deemed it unnecessary at that time to establish a Federal quarantine. The State of Illinois very promptly thereafter instituted control measures.

The enforcement of these control measures is being carried out by these two States under the advice and with the active cooperation of the Federal Horticultural Board and the Bureau of Plant Industry of this department. Similar control action is being taken in connection with the outbreak in Virginia. These measures include the burning of the straw and stubble, the disinfection of the wheat and of the thrashing machinery involved, and the elimination of the growth of wheat in the infected areas for a period of years. It is believed that by these means the spread of the diseases from these States will be prevented in so far as it is possible to accomplish this result by quarantine and control operations.

In the meantime a thorough survey is being kept up throughout the United States in cooperation with the State authorities for the determination of any other possible footholds of these diseases. It is believed that the foreign quarantine referred to at the outset will prevent any further entry of these diseases into the United States.

THE BLACK STEM RUST OF WHEAT.

The board has actively cooperated with the Bureau of Plant Industry in the campaign to secure the eradication of the common barberry, with the object of controlling the black wheat stem rust. The barberry has been demonstrated to be an important factor in the development of serious wheat rust epidemics. The losses from this disease are limited very largely to the northern wheat-producing States and are unimportant in the Southern States. The object wished, therefore, was to effect the extermination of the common barberry in such Northern States and by quarantine prohibit its movement into such States from other States. Pending the determination of the feasibility of such quarantine action, the board undertook to effect this general purpose by an agreement to be entered into by nurserymen and others interested. A circular letter describing the need, accompanied with a pledge card, was sent out April 4, 1918, and more than 2,000 nurserymen signed these pledges and thus voluntarily put into effect what was substantially a complete quarantine as to the movement of the common barberry into the region to be protected. The effectiveness of this voluntary quarantine showed the general practicability of such control, and to give it

a greater efficiency, after a stated public hearing, February 24, 1919, a quarantine was issued April 15, 1919, effective May 1, 1919. This quarantine points out that the susceptible varieties of barberry and the related Mahonias have been very largely eradicated from the States of Nebraska, Iowa, Illinois, Indiana, Ohio, North Dakota, South Dakota, Minnesota, Montana, Wisconsin, Michigan, Wyoming, and Colorado and therefore quarantines all the other States of the United States, including the District of Columbia, and orders that no plants of the species of *Berberis* and *Mahonia* enumerated in the quarantine shall be moved or allowed to move to points outside of the quarantined areas.

This quarantine places no restriction on the movement of the Japanese barberry and the Japanese *Mahonia*, the most valuable and most commonly planted of the barberries and Mahonias, and which are not alternate hosts of the disease.

COTTON IMPORTATIONS.

The restrictions placed on the entry of foreign raw cotton, cotton waste, cotton wrappings, and cotton seed and cottonseed products, to prevent the entry of the pink bollworm and other dangerous cotton pests, are being continued.

The entry of foreign cottons and of such cotton waste and cotton wrappings as must be fumigated as a condition of entry is limited to the ports of Boston, New York, San Francisco, and Seattle, where fumigating plants for this purpose have been provided. The entry of cotton waste and cotton wrappings for which disinfection is not required is permitted at any port where the board maintains inspection service.

The importation of foreign cotton was considerably reduced during the year as a result of war conditions, amounting to a total of only 179,537 bales. The cotton indicated in the tables given below as from the United States represents returned American cotton, and that indicated from Calexico, Mexico, is cotton permitted entry from the Imperial Valley, Lower California. These two items were entered without requirement of disinfection or other restrictions.

The entry of cotton waste comes in two classes, restricted and unrestricted, the former requiring disinfection and subsequent control as to utilization the same as foreign cottons. Manufactured waste from which all cotton seeds have been removed and waste from American cotton may be entered under permit without the requirement of disinfection or other restrictions. Some 415 bales of waste were entered after disinfection. Some 15,000 bales were entered without disinfection. The latter represents very largely American cotton waste which was purchased for utilization in Canada for war purposes and resold and returned to the United States at the close of hostilities.

The restrictions on the entry of cotton wrappings or bagging are necessitated by the fact that such wrappings carry considerable quantities of cotton and cotton seed, and therefore must be subjected to restrictions similar to those applying to the entry of cotton. During the year 24,236 bales of bagging entered the United States. Of this amount 2,277 bales were fumigated and the balance were permitted

entry without fumigation. The latter represented, for the most part, American cotton bagging returned to the United States after the utilization in foreign countries of the American cotton.

Foreign cotton seed is permitted entry only through the port of Calexico and from cotton grown in the Imperial Valley, Lower California. The restrictions on the entry of cottonseed cake and meal are due to the fact that such products frequently carry uncrushed cotton seeds. The entry of cottonseed oil is not restricted except as to its entry from Mexico. Cottonseed oil from Mexico is permitted entry only when the oil originates in mills in the Laguna District. Upon the entry of such oil at border ports of Mexico are placed certain restrictions intended to prevent the entry with the oil carriers of cotton seed and cotton insects.

The following tables indicate respectively the number of bales of cotton, cotton waste, and burlap, and the quantities of cotton seed and cottonseed products imported during the fiscal year.

Cotton imported during the year ended June 30, 1919.

[By port of entry and country of origin.]

| Country. | Boston. | New York. | San Francisco. | Seattle. | Providence. | Calexico. | Detroit. | Total. |
|-------------------------|---------|-----------|----------------|----------|-------------|-----------|----------|---------|
| | Bales. | Bales. | Bales. | Bales. | Bales. | Bales. | Bales. | Bales. |
| Chile..... | | 2 | | | | | | 2 |
| China..... | | 4,962 | 2,264 | 2,872 | | | | 10,098 |
| Dominican Republic..... | | 327 | | | | | | 327 |
| Ecuador..... | | 261 | | | | | | 261 |
| Egypt..... | 61,107 | 1,289 | | | | | | 62,396 |
| Haiti..... | | 10,128 | | | | | | 10,128 |
| India..... | | 3,908 | | | | | | 3,908 |
| Mexico..... | | | | | | 54,791 | | 54,791 |
| Nicaragua..... | | 33 | | | | | | 33 |
| Peru..... | | 35,791 | | | | | | 35,791 |
| Turks Island..... | | 12 | | | | | | 12 |
| United States..... | 1,188 | 372 | | | 165 | | 65 | 1,790 |
| Total | 62,295 | 57,085 | 2,264 | 2,872 | 165 | 54,791 | 65 | 179,537 |

Cotton waste imported during the year ended June 30, 1919.

[By country of origin and port of entry; all figures represent running bales.]

| Port. | Canada. | England. | Japan. | Mexico. | Spain. | United States. | Total. |
|--------------------|---------|----------|--------|---------|--------|----------------|--------|
| Boston..... | 570 | | | | | | 707 |
| New York..... | | | 80 | | 119 | 407 | 606 |
| Philadelphia..... | | 206 | | | | 465 | 671 |
| Seattle..... | | | 449 | | | | 449 |
| Niagara Falls..... | | | | 100 | | 7,301 | 7,301 |
| Laredo..... | | | | | | | 100 |
| Chicago..... | | | | | | 4,395 | 4,395 |
| Ogdensburg..... | | | | | | 126 | 126 |
| Rouses Point..... | | | | | | 20 | 20 |
| Detroit..... | | | | | | 1,085 | 1,085 |
| Total | 570 | 206 | 529 | 100 | 119 | 13,936 | 15,460 |

Bagging imported during the year ended June 30, 1919.

[By country and port.]

| Country. | New York. | Boston. | Philadel- phia. | Detroit. | Total. |
|--------------------|---------------|-----------------|--------------------|--------------|-----------------|
| Canada..... | Bales. 267 | Bales. 2,459 | Bales. 147 | Bales. 58 | Bales. 2,931 |
| England..... | 3,261 | 2,048 | 5,695 | ----- | 11,004 |
| France..... | 8,541 | ----- | ----- | ----- | 8,541 |
| Scotland..... | ----- | 68 | ----- | ----- | 68 |
| Spain..... | 1,396 | ----- | 250 | ----- | 1,646 |
| United States..... | ----- | 46 | ----- | ----- | 46 |
| Total..... | 13,465 | 4,621 | 6,092 | 58 | 24,236 |

Cotton seed and cottonseed products imported during the year ended June 30, 1919.

| Port. | Cotton seed. | Cotton- seed cake. | Cotton- seed meal. | Cotton- seed. oil. |
|--------------------|-----------------|--------------------------|--------------------------|--------------------------|
| Calixico..... | Tons. 12,677 | Tons. | Tons. | Gallons |
| Eagle Pass..... | ----- | 19,220 | ----- | 147,582 |
| Laredo..... | ----- | 1,139 | ----- | 132,000 |
| New York..... | ----- | ----- | 1,378 | ----- |
| San Francisco..... | ----- | 2,071 | ----- | ----- |
| Seattle..... | ----- | 1,709 | ----- | ----- |
| Total..... | 12,677 | 24,139 | 1,578 | 279,582 |

NURSERY STOCK, PLANT, AND SEED IMPORTATIONS.

The need of additional restrictions or prohibitions with respect to the entry of various classes of nursery stock and other plants and seeds was referred to in the report of the Federal Horticultural Board for last year, and also the holding of a public hearing at this department on May 28, 1918, at which the whole subject was fully discussed with all the interests concerned.

Following the hearing the subject was further studied by the experts of the Bureau of Plant Industry of the department, including a field examination of the conditions throughout the country, to determine the essential needs as to future plant importations. The results of these extended investigations were embodied in a tentative plant quarantine order which was sent, August 29, 1918, to plant trade journals and related societies, and to individuals who had manifested an interest in this subject, either by attending the hearing or by correspondence, with the request that the proposed quarantine be given careful consideration, with a view to a conference later to discuss and determine the desirability of the proposed restrictions. This conference was held October 18, 1918, and the quarantine was amended in minor details and promulgated by the department November 18, 1918, to take effect June 1, 1919.

This quarantine with regulations supersedes on and after June 1, 1919, the regulations theretofore in force governing the importation of nursery stock and brings under restriction all other plants and plant products for or capable of propagation. Under this quarantine fruits, vegetables, cereals, and other plant products for or capable of propagation, but intended for medicinal, food, or manufacturing

purposes, and field, vegetable, and flower seeds may be imported without permit or other restrictions.

The quarantine provides further that the following classes of plants may be imported under permit and on compliance with the other requirements of the regulations, viz, certain bulbs, rose stocks, fruit stocks, including cuttings, scions, and buds, and seeds of nut, fruit, forest, and other ornamental and shade trees and of hardy perennial ornamental shrubs.

The quarantine also provides for the importation, under special permits from the Secretary of Agriculture, of limited quantities of otherwise prohibited stock for the purpose of keeping the country supplied with new varieties of plants and stock for propagation purposes, not available in the United States.

This quarantine does not affect the status of nursery stock and other plants and seeds covered by special quarantines and other restrictive orders now in force.

The regulations governing the entry of the classes of plants listed above are similar to those hitherto in force with respect to nursery stock, and take into account the classification of countries into (1) those maintaining inspection and certification of nursery stock in accordance with the requirements of the plant quarantine act, and (2) countries which have not made provision for such compliance.

Three minor amendments have been issued with respect to this quarantine. Amendment No. 1 provides for the use of sterilized soil for packing bulbs and other plants. Amendment No. 2 is a revision of regulation 14 and is essentially an interpretation of this regulation rather than an enlargement of powers under the quarantine. The entry of new varieties of plants and of necessary propagating stock which would be otherwise prohibited under the quarantine is specially provided for in this regulation. It is further provided that all such importations shall be made through the Office of Foreign Seed and Plant Introduction of the Department of Agriculture at the cost and for the use of the importer. This method of introduction is to provide for the proper inspection and safeguarding through the agency of the highly developed inspection and quarantine service now organized by this department of the material thus imported. Amendment No. 3 provides for the entry of otherwise prohibited stock from foreign countries contiguous to the United States and has special application to the entry of such stock from the Dominion of Canada. Under this regulation such entry under stated restrictions will be permitted only of specified classes of nursery stock and other plants and seeds which can be considered as peculiar to such contiguous countries and not mere reproductions of imported stock from foreign countries.

This quarantine aroused wide criticism and protest, much of this being based, however, on misrepresentation and particularly on the charge, which was directly contrary to the facts, that the quarantine would prevent the United States from receiving the new plant creations of Europe and other foreign countries and that America would therefore be forever deprived of all such additions to its horticulture and floriculture. These protests also found large support on the part of importers whose business was necessarily restricted as a result of the quarantine. On the other hand, this quarantine received substantial indorsement from the great body of the producing nursery-men of the country.

In answer to various criticisms and to correct certain misrepresentations the board has issued several explanatory memoranda and statements, the most important being a memorandum dated February 1, 1919, giving a general discussion of the quarantine and of the conditions which led to its promulgation. A further explanatory statement was issued by the Secretary of Agriculture as a result of a conference March 1 with a committee representing the New York Florists' Club, the Association of American Florists, and the American Association of Nurserymen. The statement of the Secretary is based on an impartial investigation which he had made of the whole subject—the report of which fully supported the quarantine. These two documents have been published in trade journals and used liberally in correspondence with respect to the quarantine.

The chairman of the board, on invitation, has attended during the year important annual meetings of nurserymen and florists to discuss Federal plant quarantines and particularly quarantine No. 37. These meetings included the Pacific Coast Association of Nurserymen and Ornamental Horticulturists, at Riverside, in May; the National Association of Nurserymen, in Chicago, in July; and the Society of American Florists and Ornamental Horticulturists, in Detroit, in August. The discussion at these meetings directly and through the reports published in trade journals has brought a perhaps better understanding of the fundamental purposes underlying this quarantine to the great body of persons interested throughout the United States.

COUNTRY OF ORIGIN AND NATURE OF NURSERY-STOCK IMPORTATIONS.

The following table gives the country of origin and the classes of plants and seeds imported during the year ended June 30, 1919:

Country of origin and nature of nursery-stock importations.

| Country of origin. | Fruit trees. | Fruit tree stocks. | Grape-vines. | Bush fruits. | Roses. | Rose stocks. | Forest and ornamental deciduous trees. |
|---------------------------------|--------------|--------------------|--------------|--------------|---------|--------------|--|
| Australia..... | | | | | | | |
| Belgian Congo..... | | | | | | | |
| Belgium..... | | | | | | | |
| Bermuda..... | | | | | | | 1,975 |
| Brazil..... | | | | | | | |
| Canal Zone..... | | | | | | | |
| Canada..... | 318 | | | | 33 | | 700 |
| Chile..... | | | | | | | |
| Colombia..... | | | | | | | |
| Cuba..... | | | | | | | |
| England..... | 1,432 | | 73 | 24 | 28,048 | 1,149,000 | 4,906 |
| France..... | 1,197,137 | 5,797,025 | 167 | 571 | 334,961 | 1,378,452 | 213,273 |
| Guatemala..... | | | | | | | |
| Holland..... | 4,218 | | | 5,760 | 126,964 | 256,650 | 255,363 |
| Ireland..... | | | | | 11,142 | 137,000 | |
| Italy..... | | | | | | | |
| Japan..... | 36,755 | 24,195 | | | 9 | | 31,976 |
| Leeward Island (St. Kitts)..... | | | | | 2 | | |
| Mexico..... | | | | | | | |
| Panama..... | | | | | | | |
| Philippine Islands..... | | | | | | | |
| Samoa..... | | | | | | | |
| Scotland..... | 367 | | 23 | | 2,779 | 80,000 | 20 |
| Trinidad..... | | | | | | | |
| Venezuela..... | | | | | | | |
| Total..... | 1,240,227 | 5,821,220 | 263 | 6,355 | 503,938 | 3,001,102 | 508,213 |

Country of origin and nature of nursery-stock importations—Continued.

| Country of origin. | Orna- mental deciduous shrubs. | Conifer- ous trees other than pines. | Pines. | Ever- green trees. | Ever- green shrubs. | Field grown, florists, stock. | Stocks, cuttings, or seed- lings. | Tree seeds. | Pounds. |
|--------------------------------|---|---|--------|--------------------------|---------------------------|--|--|----------------------|----------------------|
| Australia..... | | | | | | | | | 38,280 |
| Belgian Congo..... | | | | | | | | | 150 |
| Belgium..... | 46,928 | 6,689 | ..... | 4,306 | 11,429 | 29,484 | | | |
| Bermuda..... | 7,075 | ..... |  | 9,325 | ..... | 33,509 | | | 2,454 |
| Brazil..... | | | | | | 21,326 | | | 9,399 |
| Canal Zone..... | | | | | | 150 | | | |
| Canada..... | 100 | ..... |  | 13 | ..... | 187 | 12,000 | ..... |  |
| Chile..... | | | | | | 8 | | | |
| Colombia..... | | | | | | 43,740 | | | |
| Cuba..... | | | | | | 1,800 | | | |
| Eng. and..... | 27,284 | 5,844 | ..... | 1,922 | 101,773 | 63,742 | 1,500 | | |
| France..... | 1,015,527 | 353,253 | ..... | 14,236 | 191,743 | 87,209 | 2,364,912 | 4,007 | |
| Guatemala..... | | | | | | 5,332 | | | |
| Holland..... | 425,658 | 470,677 | ..... | 18,924 | 694,528 | 87,081 | 57,607 | ..... |  |
| Ireland..... | 45 | ..... |  | 5 | 727 | 5 | | | |
| Italy..... | | | | | | | | | 5,009 |
| Japan..... | 31,284 | 7,982 | 645 | 2,427 | 7,118 | 52,638 | | | 15,233 $\frac{1}{2}$ |
| Leward Island (St. Kitts)..... | | | | | | 2 | | | |
| Mexico..... | | | | | | 4,110 | | | |
| Panama..... | | | | | | 9 | | | |
| Philippine Islands..... | | | | | | 1,703 | | | |
| Samoa | | | | | | 8 | | | |
| ectland..... | 467 | 55 | ..... | 49 | 1,095 | 12,432 | 25 | | |
| rinidad..... | | | | | | 17,836 | 30 | | 1,059 |
| enezuela..... | | | | | | 10,090 | | | |
| Total..... | 1,554,368 | 844,500 | 645 | 51,207 | 1,008,413 | 479,421 | 2,436,074 | 75,591 $\frac{1}{4}$ | |

DISTRIBUTION OF IMPORTED NURSERY STOCK, BY STATES.

The following table indicates the distribution by States of nursery stock imported during the last six years:

Distribution of imported nursery stock, by States.

| State. | Number of cases. | | | | | |
|---------------------------|------------------|---------|---------|---------|---------|---------|
| | 1918-19 | 1917-18 | 1916-17 | 1915-16 | 1914-15 | 1913-14 |
| Alabama..... | 38 | 69 | 173 | 284 | 241 | 125 |
| Arizona..... | | | 2 | 26 | 22 | 4 |
| Arkansas..... | 136 | 995 | 4,891 | 2,403 | 3,357 | 1,929 |
| California..... | 24 | 11 | 162 | 152 | 150 | 152 |
| Colorado..... | 1,002 | 413 | 801 | 1,972 | 1,372 | 1,432 |
| Connecticut..... | 13 | 1 | 54 | 53 | 40 | 38 |
| Delaware..... | 228 | 44 | 422 | 491 | 549 | 562 |
| District of Columbia..... | 9 | 19 | 200 | 1,466 | 2,461 | 56 |
| Florida..... | 29 | 96 | 223 | 191 | 228 | 196 |
| Georgia..... | 1,060 | 473 | 2,891 | 4,671 | 3,316 | 3,942 |
| Illinois..... | | | 10 | 79 | 57 | 4 |
| Hawaii..... | | | | 6 | 5 | 9 |
| Idaho..... | 144 | 89 | 464 | 577 | 569 | 545 |
| Indiana..... | 160 | 398 | 731 | 905 | 1,066 | 394 |
| Iowa..... | 3 | 15 | 105 | 55 | 51 | 48 |
| Kansas (north)..... | 50 | 133 | 96 | 292 | 292 | 286 |
| Kansas (south)..... | 265 | 77 | 188 | 410 | 320 | 352 |
| Louisiana..... | 53 | 89 | 228 | 279 | 400 | 416 |
| Maine..... | 24 | | 53 | 65 | 42 | 51 |
| Maryland..... | 152 | 154 | 308 | 595 | 736 | 553 |
| Massachusetts..... | 2,554 | 662 | 2,112 | 4,769 | 4,221 | 5,115 |
| Michigan..... | 272 | 323 | 910 | 1,325 | 1,562 | 1,232 |
| Minnesota..... | 99 | 91 | 300 | 746 | 701 | 528 |
| Mississippi..... | 17 | 17 | 40 | 21 | 23 | 35 |
| Missouri..... | 121 | 68 | 380 | 513 | 592 | 676 |
| Montana..... | | | | 36 | 32 | 26 |
| Nebraska..... | 16 | 61 | 151 | 249 | 217 | 149 |

Distribution of imported nursery stock, by States—Continued.

| State. | Number of cases. | | | | | |
|---------------------|------------------|---------|---------|---------|---------|---------|
| | 1918-19 * | 1917-18 | 1916-17 | 1915-16 | 1914-15 | 1913-14 |
| Nevada..... | | | | | 1 | 2 |
| New Hampshire..... | 7 | 2 | 40 | 44 | 53 | 57 |
| New Jersey..... | 7,668 | 2,369 | 6,860 | 13,295 | 8,829 | 10,458 |
| New Mexico..... | | | | | | 1 |
| New York..... | 6,657 | 3,937 | 8,058 | 16,325 | 12,669 | 12,363 |
| North Carolina..... | 8 | 23 | 70 | 121 | 80 | 162 |
| North Dakota..... | 25 | 1 | 20 | 56 | 12 | 8 |
| Ohio..... | 1,137 | 1,127 | 2,447 | 3,314 | 3,374 | 3,068 |
| Oklahoma..... | 4 | 3 | 14 | 17 | 15 | 13 |
| Oregon..... | 137 | 44 | 326 | 355 | 480 | 560 |
| Pennsylvania..... | 2,941 | 1,282 | 3,638 | 6,096 | 6,556 | 9,309 |
| Rhode Island..... | 378 | 33 | 212 | 562 | 741 | 606 |
| South Carolina..... | | 6 | 25 | 41 | 39 | 41 |
| South Dakota..... | 17 | 7 | 19 | 29 | 16 | 16 |
| Tennessee..... | 7 | 70 | 161 | 185 | 197 | 200 |
| Texas..... | 33 | 110 | 183 | 151 | 139 | 184 |
| Utah..... | 1 | | 19 | 25 | 27 | 35 |
| Vermont..... | | 1 | 17 | 41 | 24 | 20 |
| Virginia..... | 58 | 18 | 273 | 379 | 354 | 338 |
| Washington..... | 135 | 74 | 388 | 421 | 403 | 482 |
| West Virginia..... | 17 | | 129 | 87 | 87 | 102 |
| Wisconsin..... | 104 | 78 | 429 | 509 | 430 | 334 |
| Total..... | 25,803 | 13,495 | 39,358 | 64,652 | 57,192 | 57,225 |

INSPECTION OF IMPORTED PLANTS AND PLANT PRODUCTS.

A record has been kept since the organization of the board of all the interceptions of foreign plant pests and diseases on imported nursery stock and other plants and plant products. As a result of the requirement of the Federal plant quarantine act as to foreign inspection and certification, practically all of the foreign countries which are doing a commercial trade of any importance in such products with the United States have installed adequate inspection service, and for the most part it is undoubted that these countries are probably giving as good inspection service as human skill and science can afford. The result of this service has been a tremendous improvement in the sanitary condition of the plants and plant products imported into the United States. The infestation has been reduced to probably as near a minimum as is humanly possible. Nevertheless, the records referred to indicate that in spite of this inspection and the foreign certifications accompanying importations, large numbers of injurious insects and plant diseases are still coming into the United States on imported plants. Inasmuch as one of the principal arguments of objectors to foreign plant quarantines is that proper inspection will eliminate these evils, it is opportune at this time to call attention to a summary of the conditions actually shown by the inspection records of the last seven years as to the plant imports from the principal exporting countries. With respect to insects, these records indicate that there have been received from Holland during this period 1,051 infested shipments, involving 148 kinds of insect pests; from Belgium, 1,306 infested shipments, involving 64 kinds of insects; from France, 347 infested shipments, involving 89 kinds of insects; from England, 154 infested shipments, involving 62 kinds of insects; from Japan, 291 infested shipments, involving 108 kinds of insects; from Germany, 12 infested shipments, involving 15 kinds of insect pests. Many of these intercepted insects are not known to be established

anywhere in this country, and numbers of them, if established, would undoubtedly become important farm, garden, or forest pests.

During the fiscal year 1919, possibly as a result of the let-down due to war conditions, there was an exceptional increase of infestation of imported nursery stock with gipsy and brown-tail moth. In the previous years under this quarantine shipments thus infested had been so reduced that for the entire period of seven years only 63 infested shipments had been discovered, whereas prior to the passage of the quarantine act such instances of infestation ran up to several thousand annually. Altogether 123 species of insects were intercepted on various plants and plant products during the fiscal year just ended. In addition to gipsy-moth egg masses and brown-tail moth nests, the more important interceptions were pink bollworm-infested cotton seed from Brazil and China, European Lackey moth from Holland, fruit fly larvae from Cuba, Oriental moth from Japan, gold-tail moth from France, seed weevils infesting cherry seed from France, and a number of injurious scale insects on miscellaneous plants. Soil insects were collected on several occasions, including the European mole cricket, earwigs, Otiorchynchid larvae, wire worms, and white grubs from Holland.

With respect to plant diseases intercepted during the fiscal year 1919, 270 distinct disease organisms were identified on imported plant material. Among these, one case of powdery scab was found on potatoes from Ecuador, confirming the supposed Andean origin of this disease, and one interception of citrus canker was made at Seattle, Wash., on citrus fruits taken from passengers' baggage.

INSPECTION OF PLANT-INTRODUCTION GARDENS.

The board has continued its annual or more frequent inspection of the plant-introduction gardens maintained by the Department of Agriculture at Yarrow, Md.; Miami and Brooksville, Fla.; Savannah, Ga.; and Chico, Calif., and the field station of the Office of Dry-Land Agriculture at Mandan, N. Dak.

TERMINAL INSPECTION OF INTERSTATE MAIL SHIPMENTS OF PLANTS AND PLANT PRODUCTS.

During the year the State of Arkansas, under authority of the act of March 4, 1915, made provision for terminal inspection of mail shipments of plants and plant products originating in other States. California, the first State to make provision for such inspection, in 1915, was followed in 1916 by Arizona and Montana; in 1917 by Florida, and in 1918 by Washington.

NEW PLANT QUARANTINES.

The following foreign and domestic quarantines and other restrictive orders have been promulgated or revised during the year:

DOMESTIC.—The Japanese beetle quarantine, the European corn borer quarantine, the black stem rust quarantine, and the gipsy moth and brown-tail moth quarantine (a revision).

FOREIGN.—The bamboo quarantine and the nursery stock, plant, and seed quarantine.

The most important of these quarantines have been made the subject of specific discussion and explanation elsewhere in this report. The gipsy moth and brown-tail moth quarantine represents merely

the annual revision of this quarantine to take account of necessary changes in the distribution of these insects. The extensive clean-up operations along the western border of infestation, combined with the destruction of the egg masses by the severe cold of the winter of 1917-18, made it possible to materially decrease the area quarantined on account of the gipsy moth. As was the case during the last two years, it was again not necessary to extend the areas quarantined on account of the brown-tail moth.

COTTON WASTE AND UNMANUFACTURED COTTON USED AS PACKING FOR IMPORTED ARTICLES.

It was discovered by the inspectors of the board that considerable quantities of cotton and cotton waste containing seeds was being brought into this country in the form of packing for china, bric-a-brac, and other similar articles from Japan and China. An importation of chocolate from Mexico by parcel post packed in seed cotton was also intercepted. To guard against the possible entry of the pink bollworm with importations of this kind, at the request of this department, the Treasury Department instructed all customs officers to hold all importations packed with cotton or cotton waste and to report the facts to the local inspector of the Federal Horticultural Board at the port where the merchandise is offered for entry, or, in the absence of a local inspector at said port, either to report the shipment to the Department of Agriculture or require the importer to remove and burn all such packing under the supervision of a customs officer before entry of the merchandise is completed.

SHIP'S BALLAST AS A SOURCE OF INTRODUCING PLANT ENEMIES.

The attention of the board has been repeatedly drawn to the supposed risk of entry of plant pests in ships' ballast. This was especially urged by persons who objected to Quarantine No. 37, and who made the argument that there was a risk from such ballast equal to that of plants with soil. Through the agency of inspectors at the principal ports of entry into the United States, the board has had a careful investigation made of such ballast. It was evident that war conditions had very much increased the amount of ballast thus brought to the principal eastern ports on account of the necessity prior to the armistice of vessels employed in the transportation of troops and supplies returning for the most part in ballast. It was found, however, that material employed for such ballast would seem to involve very little risk of being the means of introduction of dangerous plant enemies. The bulk of it was found to consist of sand, gravel, broken rock, and even ashes. The soil occasionally employed seems to have been derived from river banks or from excavations for construction purposes (cellar soil). It was not shown, and it is not at all probable, that valuable garden or field soil is ever used for such ballast purposes. The sand and gravel is as a rule sold for building or other construction purposes, and the broken rock and soil have been used to some extent for filling in, and that brought in on Government vessels very largely for fills in connection with Government constructions on the water front. Some of this ballast has been towed to sea and dumped along with city waste. While there may be a possibility of plant pests being brought in with such soil, it is a very remote one, and undoubtedly such use of ballast will be very largely reduced when normal commercial conditions are resumed.

WAR ACTIVITIES.

The restrictions on foreign commerce necessitated by the war brought the Federal Horticultural Board into some cooperative relationship with the War Trade Board, particularly in regard to the importation of foreign cotton. This had to do with the determination of the amount of foreign cottons which should be permitted to enter the United States to meet essential war and other needs and to the enforcement of the regulations of this department in so far as they covered products permitted entry by the War Trade Board.

NEED FOR ENLARGEMENT OF PORT INSPECTION SERVICE.

One of the most important and useful features of the work under the board is its port inspection service. This service was started to meet the need for necessary control of the entry and disinfection of imported cotton on account of the pink bollworm. The work necessitates the maintaining of inspectors at the ports of Boston, New York, San Francisco, Seattle, and Calexico, the only ports at which foreign cottons are permitted entry into the United States. The board is also maintaining an inspection and quarantine service along the Mexican border to prevent the accidental entry of cotton and cotton seed with the railway, freight, and other traffic entering the United States from Mexico. The work of this service during the year is referred to elsewhere in this report.

In addition to the port inspection service in relation to foreign cotton, and on the Mexican border, this department is now enforcing fifteen quarantines prohibiting or restricting the entry of foreign plants and plant products. It is also enforcing seven orders regulating and restricting the entry of such products. These quarantines and orders are being enforced in part through cooperation with the customs service. The burden on the customs service, however, has grown to such an extent that it has been necessary to take over the actual enforcement of these quarantines at the principal ports of entry, as far as is possible, through the existing port inspection service referred to above. Furthermore, the officers of the customs service lack the technical information necessary for the proper enforcement of the plant quarantines.

Only two States, California and Florida, have established adequate port inspection service for the protection of their citizens and incidentally of the country as a whole. This department has been able to collaborate with the port inspection service of these two States in the enforcement of the Federal quarantines and restrictive orders referred to. The value of this State service to the States of California and Florida has been fully demonstrated, and these States are now maintaining a service of a score or more of men each, covering all the ports of entry into these States, at an annual cost of many thousands of dollars.

The need of such port inspection service has been abundantly shown by the results obtained through the protection afforded in these States and by work which has been undertaken in a limited way by the Federal Government. Such an inspection service was tentatively installed at New Orleans for six weeks, and the amount of infested plant and food material intercepted by the inspection of shipping which entered that port, including both ships' cargoes and ships' stores and miscellaneous fruits and plants carried by passengers and crews, fully demonstrated the danger which is constantly being

run at all ports of entry and especially the Pacific, Gulf, and south Atlantic ports.

It frequently happens that shiploads of products which are prohibited entry into the United States enter these ports either for transhipment of such cargoes into other vessels en route to foreign countries or for temporary purposes, such as coaling or provisioning or other immediate needs, and that such ships lie at anchor in such ports for days or weeks together. There have been repeated instances of shiploads of cotton seeds from Brazil, and even from South Africa, thus remaining at such ports as New Orleans and Norfolk—seeds which were more or less heavily infested with pink bollworm or other dangerous insects. Such cargoes involve great danger of escape of insects to adjoining fields cropped to host plants of such insects. Such shipping should be safeguarded by inspection, and the cargoes, where necessary, should be sealed or disinfected. It has become apparent, therefore, that the port inspection service of this department should be greatly strengthened.

To establish such comprehensive and thoroughgoing port inspection service as is urgently needed to prevent new plant enemies from being brought into the United States, and for a more effective administration of existing quarantines, an increase of \$100,000 in the general appropriation has been asked for in the estimates submitted for the fiscal year ending June 30, 1921.

A PLANT-QUARANTINE LAW NEEDED FOR THE DISTRICT OF COLUMBIA.

There is at present no law under which the movement of diseased or insect-infested nursery stock and other plants and plant products into the District of Columbia from surrounding or other States, or from the District of Columbia into surrounding or other States, can be adequately controlled, nor is there statutory authority for control and extermination within the District of Columbia of plant pests and diseases. Such control is exercised under State and Territorial laws elsewhere in the United States. Under present conditions, therefore, the District of Columbia is without such protection, and becomes in fact a menace to the surrounding country as a means of lodgment and dissemination of dangerous plant pests. Illustrating this condition, one of the worst pests which has recently been introduced into the United States, the oriental fruit moth, which now seriously threatens the deciduous-fruit industry of this country, gained entrance in large part through importations of ornamental stock into the District of Columbia; and there exist now within the District of Columbia thousands of peach, plum, cherry, apple, and other trees infested with this insect, affording breeding sources from which the insect has already spread to the adjacent States of Maryland and Virginia.

To meet this need a draft of a proposed amendment to the plant-quarantine act of August 20, 1912, was prepared by this board in co-operation with the office of the solicitor of this department and was submitted to Congress by the Secretary of Agriculture for incorporation with the appropriations for the Federal Horticultural Board for the fiscal year ending June 30, 1920. This amendment was approved by the House and Senate Committees on Agriculture, but failed of enactment. The powers requested are proper and necessary, and it is hoped that early favorable action on this proposed amendment can be secured.

LIST OF CURRENT QUARANTINE AND OTHER RESTRICTIVE ORDERS.

QUARANTINE ORDERS.

The numbers assigned to these quarantines indicate merely the chronological order of issuance of both domestic and foreign quarantines in one numerical series. The quarantine numbers missing in this list are quarantines which have been either superseded or revoked. For convenience of reference these quarantines are here classified as domestic and foreign.

DOMESTIC QUARANTINES.

Date palms.—Quarantine No. 6: Regulates the interstate movement of date palms or date-palm offshoots from Riverside County, Calif., east of the San Bernardino meridian: Imperial County, Calif.; Yuma, Maricopa, and Pinal Counties, Ariz.; and Webb County, Tex.; on account of the *Parlatoria* scale (*Parlatoria blanchardi*) and the *Phoenicococcus* scale (*Phoenicococcus marlatti*).

Cotton seed and cottonseed hulls.—Quarantine No. 9: Prohibits the importation of cotton seed and cottonseed hulls from the Territory of Hawaii on account of the pink bollworm.

Hawaiian fruits.—Quarantine No. 13, revised: Prohibits or regulates the importation from Hawaii of all fruits and vegetables, in the natural or raw state, on account of the Mediterranean fruit fly and the melon fly.

Sugar cane.—Quarantine No. 16: Prohibits the importation from Hawaii and Porto Rico of living canes of sugar cane, or cuttings or parts thereof, on account of certain injurious insects and fungous diseases.

Cotton.—Quarantine No. 23, revised: Regulates the movement of cotton from Hawaii to the continental United States, on account of the pink bollworm.

Five-leaved pines, Ribes and Grossularia.—Quarantine No. 26, as amended: Prohibits the interstate movement of five-leaved pines, currant and gooseberry plants from all States east of and including the States of Minnesota, Iowa, Missouri, Arkansas, and Louisiana to points outside of this area; prohibits, further, (1) the interstate movement of five-leaved pines and black-currant plants to points outside the area comprising the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, and New York, and (2) to protect the State of New York, the movement from the New England States, on account of the white-pine blister rust.

Sweet potato and yam.—Quarantine No. 30: Prohibits the movement from the Territories of Hawaii and Porto Rico into or through any other Territory, State, or District of the United States of all varieties of sweet potatoes and yams (*Ipomoea batatas* and *Dioscorea* spp.), regardless of the use for which the same are intended, on account of the sweet-potato weevil (*Cylas formicarius*) and the sweet-potato scarabee (*Eusceptes batatae*).

Banana plants.—Quarantine No. 32: Prohibits the movement from the Territories of Hawaii and Porto Rico into or through any other Territory, State, or District of the United States of any species or variety of banana plants (*Musa* spp.), regardless of the use for which the same are intended, on account of two injurious weevils, *Rhabdocnemis obscurus* and *Metamasius hemipterus*.

Gipsy moth and brown-tail moth.—Quarantine No. 33, revised: Regulates the movement interstate to any point outside of the quarantined towns and territory, or from points in the generally infested area to points in the lightly infested area, of stone or quarry products, and of the plants and the plant products listed therein. The quarantine covers portions of the States of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut.

Japanese beetle.—Quarantine No. 35: Regulates the movement interstate to any point outside the townships of Delran, Chester, and Cinnaminson, Burlington County, N. J., of green corn, commonly called sweet or sugar corn, on account of the Japanese beetle (*Popillia japonica*).

European corn borer.—Quarantine No. 36: Prohibits the movement interstate to any point outside of the quarantined area of corn fodder or cornstalks whether used for packing or otherwise, green sweet corn, roasting ears, corn on the cob, and corncobs, on account of the European corn borer (*Pyrausta nubilalis*).

Black stem rust.—Quarantine No. 38: Prohibits the movement interstate to any point outside of the quarantined area of the common barberry and its horticultural varieties, as well as certain other species of *Berberis* and *Mahonia*, on account of the black stem rust of wheat, oats, barley, rye, and many wild and cultivated grasses.

FOREIGN QUARANTINES.

Irish potato.—Quarantine No. 3: Prohibits the importation of the common or Irish potato from Newfoundland; the islands of St. Pierre and Miquelon; Great Britain, including England, Scotland, Wales, and Ireland; Germany; and Austria-Hungary, on account of the disease known as potato wart.

Mexican fruits.—Quarantine No. 5, as amended: Prohibits the importation of oranges, sweet limes, grapefruit, mangoes, achras sapotes, peaches, guavas, and plums from the Republic of Mexico, on account of the Mexican fruit fly.

Five-leaved pines, Ribes, and Grossularia.—Quarantine No. 7, as amended: Prohibits the importation from each and every country of Europe and Asia, and from the Dominion of Canada and Newfoundland, of all five-leaved pines and all species and varieties of the genera *Ribes* and *Grossularia*, on account of the white-pine blister rust.

Cotton seed and cottonseed hulls.—Quarantine No. 8, as amended: Prohibits the importation from any foreign locality and country, excepting only the locality of the Imperial Valley, in the State of Lower California, Mexico, of cotton seed (including seed cotton) of all species and varieties, and cottonseed hulls, on account of the pink bollworm. Cotton and cotton seed from the Imperial Valley may be entered under permit and regulation.

Seeds of avocado or alligator pear.—Quarantine No. 12: Prohibits the importation from Mexico and the countries of Central America of the seeds of the avocado or alligator pear, on account of the avocado weevil.

Sugar cane.—Quarantine No. 15: Prohibits the importation from all foreign countries of living canes of sugar cane, or cuttings or parts thereof, on account of certain injurious insects and fungous diseases. There are no restrictions on the entry of such materials into Hawaii and Porto Rico.

Citrus nursery stock.—Quarantine No. 19: Prohibits the importation from all foreign localities and countries of all citrus nursery stock, including buds, scions, and seeds, on account of the citrus canker and other dangerous citrus diseases. The term "citrus," as used in this quarantine, includes all plants belonging to the subfamily or tribe *Citrate*.

European pines.—Quarantine No. 20: Prohibits, on account of the European pine-shoot moth (*Eretria buoliana*), the importation from all European countries and localities of all pines not already excluded by Quarantine No. 7.

Indian corn or maize and related plants.—Quarantine No. 24, as amended: Prohibits the importation from southeastern Asia (including India, Siam, Indo-China, and China), Malayan Archipelago, Australia, New Zealand, Oceania, Philippine Islands, Formosa, Japan, and adjacent islands, in the raw or unmanufactured state, of seed and all other portions of Indian corn or maize (*Zea mays L.*), and the closely related plants, including all species of Teosinte (*Euchlaena*), Job's tears (*Coix*), *Polytoca*, *Chionachne*, and *Sclerachne*, on account of the downy mildews and *Physoderma* diseases of Indian corn, except that Indian corn or maize may be imported on compliance with the conditions prescribed in the regulations of the Secretary of Agriculture.

Citrus fruit.—Quarantine No. 28: Prohibits the importation from eastern and southeastern Asia (including India, Siam, Indo-China, and China), the Malayan Archipelago, the Philippine Islands, Oceania (except Australia, Tasmania, and New Zealand), Japan (including Formosa and other islands adjacent to Japan), and the Union of South Africa of all species and varieties of citrus fruits, on account of citrus canker, except that oranges of the mandarin class (including satsuma and tangerine varieties) may be imported on compliance with the conditions prescribed in the regulations of the Secretary of Agriculture.

Sweet potato and yam.—Quarantine No. 29: Prohibits the importation for any purpose of any variety of sweet potatoes or yams (*Ipomoea batatas* and

Dioscorea spp.) from all foreign countries and localities, on account of the sweet potato weevils (*Cylas* spp.) and the sweet potato scarabee (*Euscepes batatae*).

Banana plants.—Quarantine No. 31: Prohibits the importation for any purpose of any species or variety of banana plants (*Musa* spp.), or portions thereof, from all foreign countries and localities, on account of the banana root borer (*Cosmopolites sordidus*).

Bamboo.—Quarantine No. 34: Prohibits the importation for any purpose of any variety of bamboo seed, plants, or cuttings thereof capable of propagation, including all genera and species of the tribe *Bambuseae*, from all foreign countries and localities, on account of dangerous plant diseases, including the bamboo smut (*Ustilago shiraiana*). This quarantine order does not apply to bamboo timber consisting of the mature dried culms or canes which are imported for fishing rods, furniture making, or other purposes, or to any kind of article manufactured from bamboo, or to bamboo shoots cooked or otherwise preserved.

Nursery stock, plants, and seeds.—Quarantine No. 37, as amended, with regulations (effective on and after June 1, 1919): Prohibits the importation of nursery stock and other plants and seeds from all foreign countries and localities on account of certain injurious insects and fungous diseases, except as provided in the regulations. Under this quarantine the following plants and plant products may be imported without restriction: Fruits, vegetables, cereals, and other plant products imported for medicinal, food, or manufacturing purposes, and field, vegetable, and flower seeds. The entry of the following plants is permitted under permit: Lily bulbs, lily of the valley, narcissus, hyacinths, tulips, and crocus; stocks, cuttings, scions, and buds of fruits; rose stocks, including manetti, multiflora, briar rose, and rosa rugosa; nuts, including palm seeds; seeds of fruit, forest, ornamental, and shade trees; seeds of deciduous and evergreen ornamental shrubs, and seeds of hardy perennial plants.

Provision is also made for the issuance of special permits under safeguards to be prescribed in such permits for the entry in limited quantities of nursery stock and other plants and seeds not covered in the preceding lists for the purpose of keeping the country supplied with new varieties and necessary propagating stock.

Flag smut and take-all.—Quarantine No. 39, with regulations (effective on and after August 15, 1919): Prohibits the importation of seed or paddy rice from Australia, India, Japan, Italy, France, Germany, Belgium, Great Britain, Ireland, and Brazil on account of two dangerous plant diseases known as flag smut (*Urocystis tritici*) and take-all (*Ophiobolus graminis*). Wheat, oats, barley, and rye may be imported from the countries named only on compliance with the conditions prescribed in the regulations of the Secretary of Agriculture.

OTHER RESTRICTIVE ORDERS.

The regulation of the entry of nursery stock from foreign countries into the United States was specifically provided for in the plant-quarantine act. The act further provides for the similar regulation of any other class of plants or plant products when the need therefor shall be determined. The entry of the plants and plant products listed below has been brought under such regulation:

Nursery stock.—The conditions governing the entry of nursery stock and other plants and seeds from all foreign countries and localities are indicated above under "Foreign quarantines." (See Quarantine No. 37.)

Irish potatoes.—The importation of Irish potatoes is prohibited altogether from the countries enumerated in the potato quarantine. Potatoes may be admitted from other foreign countries in accordance with the order of December 22, 1913, bringing the entry of potatoes under restriction on account of injurious potato diseases and insect pests. The following countries have qualified for the importation of potatoes under the regulations issued under said order: Denmark, Holland, Belgium, Cuba, Bermuda, and the Dominion of Canada. The regulations issued under this order have been amended so as to permit, free of any restrictions whatsoever under the plant-quarantine act, the importation of potatoes from any foreign country into the Territories of Porto Rico and Hawaii for local use only and from the Dominion of Canada and Bermuda into the United States or any of its Territories or Districts.

Avocado, or alligator pear.—The order of February 27, 1914, prohibits the importation from Mexico and the countries of Central America of the fruits of the avocado, or alligator pear, except under permit and in accordance with the

other provisions of the regulations issued under said order, on account of the avocado weevil. Entry is permitted only through the port of New York, and is limited to the large, thick-skinned variety of the avocado. The importation of the small, purple, thin-skinned variety of the fruit of the avocado and of avocado nursery stock under 18 months of age, is prohibited.

Cotton.—The order of April 27, 1915, prohibits the importation of cotton from all foreign countries and localities, except under permit and in accordance with the other provisions of the regulations issued under said order, on account of injurious insects, including the pink bollworm. These regulations apply in part to cotton grown in and imported from the Imperial Valley, in the State of Lower California, in Mexico.

Corn.—The order of March 1, 1917 (Amendment No. 1, with Regulations, to Notice of Quarantine No. 24), prohibits the importation of Indian corn or maize in the raw or unmanufactured state from the countries and localities listed in Notice of Quarantine No. 24, except under permit and in accordance with the other provisions of the regulations issued under said order, on account of injurious diseases of Indian corn.

Cottonseed products.—The order of June 23, 1917, prohibits the importation of cottonseed cake, meal, and all other cottonseed products, except oil, from all foreign countries, and a second order of June 23, 1917, prohibits the importation of cottonseed oil from Mexico except under permit and in accordance with the other provisions of the regulations issued under said orders, on account of injurious insects, including the pink bollworm.

Citrus fruits.—The order of June 27, 1917 (Notice of Quarantine No. 28, with Regulations), prohibits the importation from the countries and localities listed therein of all species and varieties of citrus fruits, excepting only oranges of the mandarin class (including satsuma and tangerine varieties), on account of the citrus-canker disease. Oranges of the mandarin class (including satsuma and tangerine varieties) may be imported under permit and in accordance with the other provisions of the regulations issued under said order.